

SURVEY OF INDIAN AGRICULTURE 2010



INNOVATION

Innovations for disaster management

We have not even begun to take note of short and long term consequences of blocking the veins of nature i.e., the natural drainage lines. We have to prepare not only for known natural disasters like droughts, floods, cyclone, hailstorms, etc., but also for human induced disasters, says **Prof. Anil Gupta**, Vice Chairman, National Innovation Foundation (NIF), Ahmedabad

Given various changes in climatic parameters, loss of resilience, extreme weather events and human made triggers for pest and disease epidemics, disasters are not uncommon in tropical agriculture. In some regions such as eastern India as well as Brahmaputra basin in north-east, floods are a regular phenomena.

The droughts occur in rest of the country but also in the eastern parts at least once in three to four years with varying intensity. A natural event becomes disaster also when social institutions fail to cope with them or public policy ignores the phenomena or deals with it sluggishly. My focus here is restricted to the grassroots innovations as well as outstanding traditional knowledge which helps communities to face the consequences of disaster or make adjustments in anticipation of them. Or, mitigate the effects during the occurrence of disaster.

Floods

Architecturally, the houses are made on the stilts to let the flood water flow underneath. But with higher rate of glacier melting and sudden spurts in temperature, flash floods occur often. The height of the stilts of traditional houses becomes a constraint as uncertainty increases. Damage follows. Mastitis, foot rot, black leg, etc., are post-flood diseases of animals. Honey Bee database is very rich in farmers' own solutions in the matter. Recently, a formulation based on the knowledge of Shri, Ukhardiyabhai Somabhai Raot (Gavdahad, Singhana, Ahwa) and other communities was pooled, tested and developed in Sadbhav-SRISTI Sanshodhan Lab (sristi.org).

Sharing benefits

It was found by Karnataka Antibiotics to have shown much higher effectiveness than the known solutions in the market place. And the relief occurred to animals much faster. Now, this product would be commercialized by Karnataka Antibiotics, a Central Government undertaking with the help of SRISTI and NIF and share the benefits with the innovators, their communities and the nature. Crisis can sometime trigger creativity.

In agriculture, the development of technology for deep water conditions has not kept pace with the need. The damage to the crop in both upland conditions due to drought and low land conditions due to flood is rampant. Some farmers in Bangladesh developed a very interesting salvage technology. From among the paddy plants which survived the flood, they cut the stem into small sets, just as in sugarcane with rooting at each node.

One generates several plants in this process from one surviving plant. The relay cropping of wheat, lathyrus, lentil, etc., in paddy field is another way in which farmers

manage to overcome the problem of too much of residual moisture and very little turnaround time. The floating beds of nursery is another creative way of transporting seedlings to far off places. Pradeepta pradhan (angul, Orissa) farms on floating crop beds.

Straw beds

He makes beds of straw and husks of various kinds, manures them and grows even paddy and other crops on these floating beds. In case of planting boro i.e., winter paddy, farmers are aware that the rate of tillering goes down as the transplantation time gets delayed. They, therefore, plant more seedlings per hill and have more hills per sq meter as the time passes because of excessive moisture left over by floods. The population of ear bearing tillers is optimized.

After recession of flood water, the fish get trapped in small holes in the basin. Farmers use certain kind of leaves to force fish to get out so that they could catch them. It is a post-disaster survival strategy.

During the flood, one of the major problems is transportation of essential medicines, milk for children and other necessary things. Two innovators, Mr. Saidullah from Motihari district and Mr. Dwarka Prasad Chaurasia



Mr. Dwarka Prasad Chaurasia developed an amphibious rikshaw that can be pedalled on water.

Photo: The Hindu Archives

from Mirzapur (see www.nifindia.org) developed different designs of amphibious cycles, shoes for walking on water and Saidullah developed an amphibious rikshaw also. However, not many relief agencies have used these solutions so far. Some people have developed alarm for indicating rise in water table at the dam site so that timely decision could be taken about operation of sluice gates or for evacuation of people.

Drought

The people in drought prone regions often migrate or adjust with very low level of subsistence after disposing of a few assets that they may have. Every episode of disaster dissolves the gains of the good years and situation remains precariously close to the edge.

Among the innovations and traditional knowledge practices that people have evolved in these regions are: location specific designs of water harvesting structures, salvage technologies, smaller people having higher tree density on the cultivated drylands for conservation and livestock feed and numerous other technologies.

Shri. Sunda Ram of Sikar district has developed a very interesting technology of growing trees in drylands with just one litre water once. Before the monsoon season, he opens the furrows in the regions where trees are to be planted. Rain water is allowed to infiltrate, no matter how little. After the rain, planking and laddering is done to break the capillaries so that whatever moisture is under the ground remains there.

In the month of October/November, he digs a small pit, just enough to contain the sapling and puts just one litre water. Since the upper surface of the soil by then has dried up, the only place where moisture is available is below the ground. The saplings are forced to send roots downward. Unlike trees planted during monsoon season, with this technique, survival rate is more than 60 – 70 per cent. Reducing future damage of drought, trees are a mitigating force and help among others, poor livestock keepers to get fodder when crops fail.

During a study in early 80's, it was discovered that poor people had no comparative disadvantage in maintaining the small livestock such as goat and sheep. Average value of livestock as an index of the ability to maintain, among rich and poor did not vary for small ruminants. But for large animals, such as cattle and camel, the bigger farmers had more healthy and valuable animals.

One of the paradoxes of drought

One of the paradoxes of drought is that the better animals are disposed off first because they lose their value fast. In fact, during a study of assembly debates with Dr Subramanian in Karnataka, a member had pointed out that declining prices of cattle was a very good indicator of imminent disaster.

With the demand remaining constant, the increase in supply, particularly for meat purposes, brought the prices down. The small ruminants lose their value and often life after the rains come. They have higher mortality rate and thus the value of the assets of the poor go down in the post-drought period.

Lot of innovations and traditional knowledge practices have been collected by SRISTI, NIF and other members of Honey Bee Network for disease and pest, feed and fodder and general health management of animals.

Many of these farmers have also received patents, in some cases their technologies have been commercialized

and in many cases, the traditional viable practices are available in open source for larger societal application at sristi.org and honeybee.org.

The unique traditional knowledge of Shri Sakrabhai Kallubhai Bhariya, (Bhuval, Devgad Bhariya, Dahod), and Smt. Kapooriben Sardarsingh Chawhan, (Ved-Dundarfaliu, Dhanpur, Dahod) led to the development of a drug for bloat, a common problem in the post-flood season/during rains after the drought when animals eat excessive green fodder. This product is also being commercialized with an accompanying benefit sharing arrangement. Several other kinds of disasters such as unseasonal rains, pest and disease epidemic, and earthquake could play havoc with the livelihoods of farmers.

When early rains started at the time of wheat crop maturity in north India during the month of April, a new problem of germination in the ear was faced decades ago. The breeders had to focus on developing higher dormancy in the seeds to prevent germination and loss of productivity. The problem of pest and disease epidemic is well known in the history. G.L. Carefoot and E.R. Sprott [1967], in their seminal contribution, "Famine on the wind: plant diseases and human history" brought out the role plant diseases have played in the history triggering migrations and evolution of new civilizational clusters. Thurston also developed a database of major episodes of plant diseases affecting the evolution of human society. He also documented how people have coped with it in the ancient times.

Valiant effort

His valiant effort to mainstream traditional knowledge in modern science deserves much better recognition. In Honey Bee database, we have thousands of examples of farmers' own attempt to deal with the disease or pest triggered crisis.



Mr. Saidullah developed an amphibious rikshaw that can be pedalled on water. - Photo: The Hindu Archives



Mr. Sunda Ram of Sikar district, Rajasthan has developed a very interesting technology of growing trees in drylands with just one litre water once. - Photo: The Hindu Archives

Use of milk for viral disease control in chilly, tobacco, tomato, beans, etc., has been studied since early thirties. The fact that farmers still use milk (Lassiben uses goat milk for controlling leaf curl in chilli), whey milk and other such products demonstrates the continuing efficacy of these approaches.

The regrettable matter is that such knowledge is not part of the repertoire of national and state level Disaster Management Authorities and therefore lot of people continue to suffer despite availability of solutions with varying degree of effectiveness. *

Urgent need

There is an urgent need to develop an all India coordinated research project on disaster management in agriculture keeping in mind extreme variability induced by climatic parameters and other natural and man-made factors.

Huge investments of trillions of rupees in the coming years on infrastructure is going to affect the land use, drainage, watershed properties and other aspects of agriculture. We have not even begun to take note of short and long term consequences of blocking the veins of nature i.e., the natural drainage lines. We have to prepare not only for known natural disasters like droughts, floods, cyclone, hailstorms, etc., but also for human induced disasters.

In Jammu & Kashmir, every year thousands of tons of unripe apples fall down due to hailstorm. Farmers suffer but there is not a single unit collecting these fallen apples and extracting valuable phytochemicals and giving value to the farmers.

If we cannot avoid disasters, we must mitigate the

consequences by building upon a whole range of dynamic decision trees of contingency options. The deposition of silt and sand by the flood in different parts of eastern India does good in some cases for the crops and damage in other cases. Where do we have a mix of strategies to cope with such consequences.

We don't even want to learn from people's own coping strategies. In cotton, one of the biggest disasters in recent times has been the incidence of thousands of farmers committing suicide.

When I visited families of some of the farmers who committed suicide in Vidharbha for developing a proposal on knowledge management system for preventing such tragedies, I did not find a single case where well-known, non-monetary solutions for pest control had been shared with those families.

They did not know [perhaps do not know even now] that by growing lady's finger, a plant belonging to the same family as cotton and flowering earlier than cotton, they could trap the pests on border crop of lady's finger and save the cotton significantly.

They also were not informed about the experiments by Gujarat farmers Shri Jethabhai Arshibhai Kamaliya, (Shakrana, Jutthal, Mangrol, Junagarh), Shri Kanchanbhai Dwarka Das Patel (Kandach, Kalol, Panchmahal), Dhirubhai Dayaljiibhai Patel (Ghej, Chikhli, Valsad), Saraj Bhai Sindha, Jambusar, Honey Bee, 3(2):18, 1992, to sprinkle jaggery/sugar solution [one kg in 15 litres water] to attract the black ants so as to kill the pests. It does not cost much even if such solutions do not work in every case. When the cost of failure is low, the chances of success high, only inertia can explain lack of experimentation.